Original Article

Congenital coronary anomalies in Iraqi adult population

Hamid Abdul Wahab Al-Amiry , FICMS.cardio *
Hasan Yousif Al-Najjar , FRCP **
Amjad Rahman Bairam ,FICMS.cardio ***

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Summary:

Background: Geographic variations in the incidence of different congenital coronary anomalies are well known, but infrequently studied in the Iraqi population. Recognition of coronary anomalies is important in patients undergoing coronary arteriogrphy; coronary interventions and cardiac surgery .Variation in the frequency of primary congenital coronary anomalies may possibly have a genetic background.
Patients and methods: Three thousands adult patients underwent diagnostic coronary angiography at two cardiac centers in Baghdad between January 2003 to March 2006. Their angiographic films were reviewed by at least two experts in coronary angiographic study.
Results: Among 3000 adult patients who underwent diagnostic coronary angiography, 28(0.93%) patients (16 males, 12 females) had anomalous coronary artery. The mean age was 46±8 years (range from 28-73 years).Twenty four patients (85%) had anomalies of origin and distribution, while the remaining four (15%) had coronary artery fistulae. Abnormal origin of the left circumflex was the most common anomaly, seen in 17(60%) patients. Coronary artery fistula was seen in four patients; from the left anterior coronary artery to the pulmonary trunk in two cases and from the right coronary to the pulmonary trunk in the other cases. Left main stem was absent in four cases (15%).While abnormal origin of the right coronary artery from the left circumflex was seen in two cases. Abnormal origin of the right coronary artery from the pulmonary artery was seen in just one case (3.5%). Atherosclerotic plaques in the anomalous artery were seen in four cases (15%) much less than overall case of coronary artery disease in those who underwent coronary angiography (60%).
Conclusion: Isolated congenital coronary anomalies in adult is rare and there does not appear to be an increased risk for development of atherosclerosis in anomalous coronary arteries.
Key words:
Coronary anomalies, angiography, congenital

Introduction:

Primary congenital anomalies of the coronary arteries occur as isolated anomalies and are not necessarily associated with other types of congenital heart disease (1). These could be haemodynamically significant by leading to abnormal myocardial perfusion, while haemodynamically insignificant anomalies are principally those of abnormal aortic origin or distribution of coronary arteries, and myocardial perfusion is usually not altered in these individuals.

**Ibn Al-Bitar Hospital for Cardiac Surgery Baghdad, Iraq*
***Medical City, Baghdad,Iraq.*
****Ibn Al-Bitar Hospital for Cardiac Surgery Baghdad, Iraq.*

Widespread application of coronary arteriography has resulted in more frequent detection of patients with anomalous coronary arteries, and their clinical significance is becoming better appreciated (2,3,4,5,6,7,8,9) .

Unrecognized coronary anomalies may lead to errors in clinical diagnosis and surgical problems(in mitral or aortic valve replacement it might cause compression of the anomalous left circumflex (LCX) artery from right coronary artery(RCA). When planning coronary angioplasty on anomalous coronary artery, there is an even greater need to accurately define the origin and course of these vessels. Certain anomalous coronary arteries are associated with sudden cardiac

death (left anterior descending artery (LAD) if originated from RCA and pass between the left ventricular outflow tract and the right ventricular out flow tract), myocardial infarction and anginal syndrome (2,3,4,5,6)

Angiographic recognition of coronary anomalies prior to cardiac surgery is of great importance. Surgical problems may follow if an anomalous vessel is excluded from perfusion during cardiopulmonary bypass or if the surgeon unwittingly incises the anomalous vessel (10). Failure to recognize them can also lead to inadequate or prolonged procedures . During valve replacement surgery, the ostium of the anomalous vessel can be inadvertently obstructed or the anomalous vessel may be compressed along its course by a valvular prosthesis (11, 12,13,14,15,16) .

Also accurate identification of origin and course of anomalous coronaries is mandatory before planning coronary interventions (13, 14), so that an appropriate guiding catheter, wire advancement and balloon systems may be selected.

Primary congenital coronary anomalies are detected in about 0.6-1.3 of adult patients undergoing coronary arteriography (2, 4,6,7,8,9) . Geographic variations in the frequency of different coronary anomalies are well known (7, 17,18,19,20,21).

The aim of this study is to estimate the incidence and type of the primary coronary anomalies detected during routine coronary arteriography of adult, show the gender difference in Iraqi adult patients.

Patient and methods

In this cross-sectional study we reviewed the data of two cardiac catheterization laboratories ; The Iraqi Center for Cardiac Diseases and Ibn-Albitar Hospital for Cardiac Surgery from January 2003 to March 2006.

Inclusion criteria: those underwent coronary angiographic study because of anginal symptom or in preparation for surgery

Exclusion criteria: those who have congenital coronary anomalies in the setting of congenital heart diseases or have total occluded coronary arteries.

The angiographic films were analyzed, by two independent experts in coronary angiography, who reach a consensus on the origin and course of the anomalous coronary arteries.

Results

Patient population

The study included 3000 patient who underwent diagnostic coronary angiography during the study period. The indication was evaluation of coronary artery disease in all patients . Age from 28 to 73 years.

Incidence

Twenty eight cases out of 3000 patients (0.93 %) in our angiographic population had congenital coronary anomalies. There were 16(53.4%) males and 12 (46.6%) females. The mean age was 46 ±8 years. (range from 28-73 years) see table 1.There were 24 (85.7%) patients with anomalies of origin and distribution, while 4 (14.3%) had coronary artery fistulae.

Classification

Figure one shows the different types coronary anomalies in our angiographic populations and their distribution.

1 Anomalous left circumflex coronary artery

Anomalous left circumflex coronary artery was the commonest coronary anomaly and was present in 17(56.1%) patients with angiographic incidence of 0.53%. It originated from the right sinus in 15 patients(fig. 2) and from the right coronary artery in 4 patients. Its initial course was retro aortic in all cases. Peripheral distribution was normal in all cases. The left anterior descending coronary artery in all of them originated from a separate ostium in the left sinus and had a normal distribution.

2- Absent left main stem coronary artery

Absent left main stem coronary artery was present in 4 patients (14%) with angiographic incidence of (0.0013%). The left anterior descending coronary artery and the left circumflex coronary arteries arose from two separate ostia from the left coronary sinus with a normal peripheral distribution. See fig (3).

3-Anomalous right coronary artery

Anomalous right coronary artery was present in two (7.1%) patients with angiographic incidence of (0.00066%). It originated from the left circumflex coronary artery . The final distribution was normal. The origin and distribution of the left coronary artery was normal in all these cases. (fig 4)

4- Coronary artery fistulae

Coronary artery fistulae were present in four (14%) patients with angiographic incidence of 0.13%. In two of them the fistula was present between the left anterior descending coronary artery and the pulmonary artery (fig. 5) and the remaining was present between the right coronary artery and the pulmonary artery

5- Anomalous origin of the RCA from the pulmonary artery

Anomalous origin of the right coronary artery from the pulmonary artery was present in only one case(0.03%).(fig 6)

Coronary artery disease in anomalous coronaries

The incidence of atherosclerotic coronary artery disease in patients with coronary anomalies was about 30% (eight patients), six of them had the left circumflex originated from the right coronary artery .The lesion involving the native coronary (right coronary artery) in most of them. The remaining patients had absent left main stem and had the lesion limited to the left anterior descending coronary artery.

Discussion

We found an overall incidence of 0.93% among patients undergoing diagnostic coronary arteriography; this is in agreement with 0.6-1.3 % incidence as reported in different studies [2, 4, and 9]. More men than women had anomalous coronaries, possibly because more angiogram were done in male patients. However , it is to be noted that we have not included patient with congenital heart disease and patient with common innocuous variation in the coronary arterial pattern(high or low take off of coronary arteries).these variations have been included in a few studies [8,9], while excluded in others[6,7,22].

The commonest anomaly in our study was anomalous origin of the left circumflex artery 57 %(17 patients). Only Topaz et al. [7] have finding in disagreement with our study and depict that anomalous origin of the right coronary artery was the most common cause but he had included also patients with congenital heart diseases. All other reports [6, 22, and 23] had similar finding in placing the anomalous left circumflex as the most common anomaly. The course of left circumflex coronary artery was retro aortic as reported in all other previous studies [6-9, 22, 23].

The second commonest anomaly in our study was coronary artery fistulae 14 %(four patients) this was in agreement with Cleveland clinic study [8]. We encountered only four patients with fistulae. There was not a single patient with this anomaly in the Hungarian series of primary congenital anomalies [9]. However Topaz et al. reported an 11% incidence of these anomalies in there studies but associated congenital anomalies were present in 44% of patients [7]. We didn't encounter any patient with anomalous origin of the left anterior descending coronary artery from the pulmonary trunk as compared with Topaz et al [7], but instead we have one case with abnormal origin of the RCA from the pulmonary artery

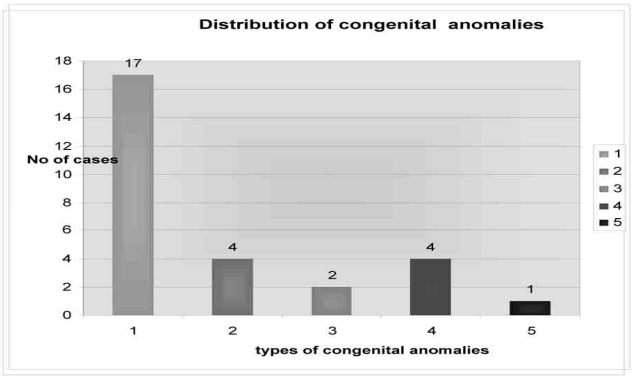
A few studies[8,9] which included the absent left main stem coronary artery in there studies have shown a greater incidence of this anomalies as compared with our study this is possibly because of our small sample size.

Involvement of the anomalous coronaries in atherosclerosis is at best controversial , previous studies have reported a greater degree of atherosclerotic involvement of the anomalous left circumflex artery, especially in its proximal segment, and it is suggested to be due to its retroaortic course [27]. But in our study, only about 30% of these patients had evidence of atherosclerosis(significant stenosis involving the proximal right coronary artery) this is in agreement with Topaz et al[7].Our study was in agreement with others in that there is no predisposition for atherosclerosis of the proximal anomalous coronary artery[7,27].

Table 1
The major types of congenital anomalies

	Number of Patients	Angiographic incidence(%| 3000 cases)	Anomaly incidence(%)
Anomalies of coronary origin and distribution	**24**	**0.80**	**85.72**
Coronary artery fistulae	**4**	**0.0013**	**14.28**
Total coronary anomalies	***28***	***0.93***	***100***

Figure 1
DISTRIBUTION OF THE TYPES OF CONGENITAL ANOMALIES



1=anomalous origin of LCX from RCA
2 = absent LMS
3= anomalous origin of RCA from LCX
4=coronary fistulae
5=anomalous origin of the RCA from the pulmonary trunk

Fig 2

Anomalous origin of the left circumflex artery from the right coronary sinus

Fig 3
Absent left main stem artery

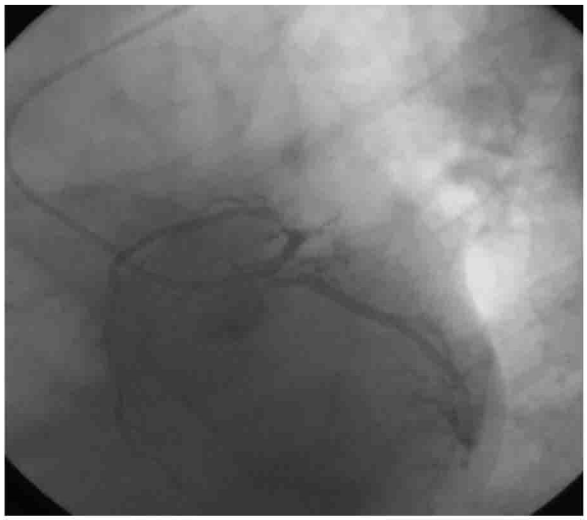


Fig 4
anomalous origin of the RCA from the LCX

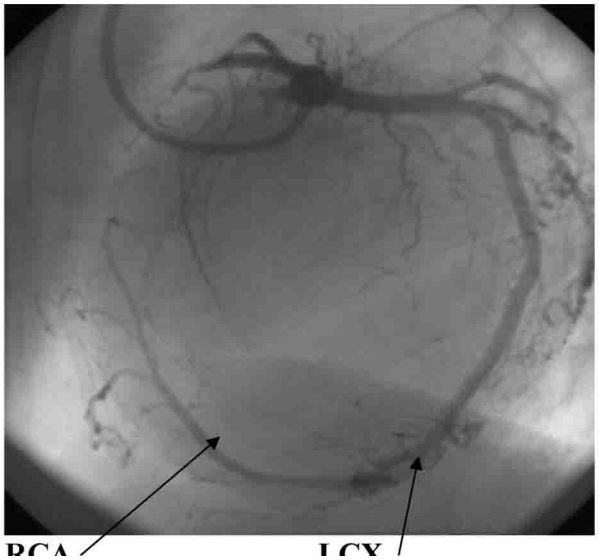


Fig 5
Coronary artery fistula

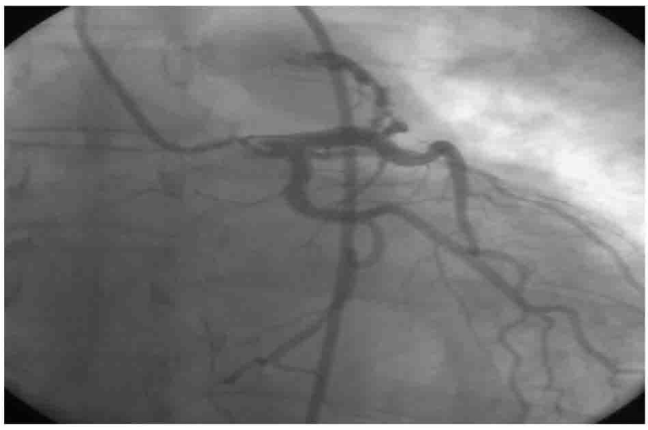
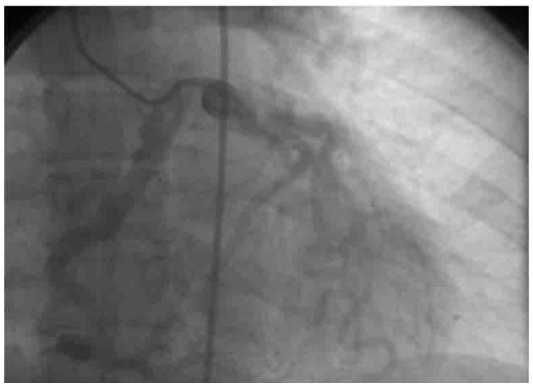


Fig 6
Origin of the right coronary artery from the pulmonary artery



References

1- Levine DC, Fellow KE, Abrams Hl. Haemodynamically significant primary anomalies of the coronary arteries: angiographic aspects. Circulation 1978; 58:25-34.

2- Liberthosn RR, Dinsmore RE, Bharti S et al. Aberrant coronary artery origin from the aorta. Circulation 1974; 50:774.

3- Page Jr.HL, Engle HJ, Campbell WB, Thomas Jr.CS.Anomalous origin of left circumflex coronary artery: recognition, angiographic demonstration and clinical significance.Circulation 1974; 1:50:768.

4- Engle HJ,Torres C,Page HL.Major variation in anatomic origin of the coronary arteries.Cathet Cardiovascular Diagn 1974;1:157.

5- Chietlin MD, De Castro CM, Mc Allister HA .Sudden death as a complication of anomalous of left coronary origin from the anterior sinus of valsalva.Circulation 1974; 50:780.

6-Chitman BR,Lesperance J,Saltiel J,Bourassa MG. Clinical angiographic , and haemodynamic findings in patients with anomalous origin of the coronary arteries. Circulation 1976; 53:122.

7-Topaz O,De Machena EJ ,Perin E,Sommer LS,Mallon SM,Chahine RA. Anomalous coronary arteries: angiographic findings in 80 patients .Int J Cardiol 1992;34:129-38.

8-Yamanaka O, Hobbs RE. Coronary artery anomalies in 126,595 patients undergoing coronary arteriography. Cathet Cardiovasc Diagn 1990, 21:28-40.

9-Kardos A,Balsai L, Rudas L et al.Epidemiology of congenital coronary artery anomalies :a coronary arteriographic study on a Central European population .Cathet Cardiovascular Diagn 1997;42:270-5.

10-Longenecker CG, Reentsma K, Creech Jr.O.Surgical implications of single coronary artery: a review and two case reports .Am Heart J 1961; 61:382.

11- Robert WC, Morrow AG.Compression of anomalous left circumflex coronary arteries by prosthetic valve rings.J thorac Cardivasc Surg 1969; 57:834-7.

12- Dc Morchena EJ, Russo CD, Wazinak pm, KM. Compressions of an anomalous left circumflex coronary artery by a bioprosthetic valve ring.J Cardiovasc Surg 1990; 31:52-4.

13-Bass TA, Miller AB, Rubin MR, Stowers SA, Perryman RA. Transluminal angioplasty of anomalous coronary arteries. Am heart J 1986; 112:610-3.

14-Topaz O, Di Sciasco G, Gopudrean et al. Coronary angioplasty of anomalous coronary arteries: notes on technical aspects. Cathet Cardiovascular Diagn 1990; 21:106-11.

15- Benson PA. Anomalous aortic origin of coronary artery with sudden death: case report and review. Am Heart J 1970; 79:254.

16-Pachinger OM, Vanden HP, Judkins MP. Single coronary artery- a cause of angina pectoris. Eur J Cardio 1974; 2:161.

17-Symmers WSC. Note on accessory coronary arteries. J Anat 1970; 41:141.

18-Chaudhry MS.Some observations on coronary artery pattern and intercoronary anastomoses in human hearts. Medicus Karachi 1965; 30:162-72.

19-Schlesinger MG, Zoll PM, Wessler S. The conus artery: a third coronary artery. Am Heart J 1949; 38:823-36.

20-Topaz O, Di Sciascio G , Cowley MJ et al. Absent left main coronary artery; Angiographic findings in 83 patients with separate ostia of left anterior descending and circumflex arteries at the left aortic sinus . Am Heart J 1991;12:447-52.

21-Kurja HJ, Chaudhry MS, Olsen TR.Coronary artery variation in a native Indian population. Cathet Cardiovascular Diagn 1986; 12:447-52.

22-Kimbris D,Iskandrian AS ,Segal BL,Bemis CE .Anomalous aortic origin coronary arteries .Circulation 1978;58:606-15.

23-Ogden JA. Congenital anomalies of coronary arteries. Am J Cardiol 1970; 25:474-9

24-Click RL, Holmes Jr.DR, Vliestran RE, Konsinki AS, Kronmal RA.Anomalous coronary arteries: location degree of atherosclerosis and effect on survival-a report from the coronary arteries surgery study. J Am Coll Cardiol 1989; 13:531-7.

25-Cohen DJ, Kim D, Baim DS. Origin of left main coronary artery from the non-coronary sinus of valsalva. Cathet Cardivasc Diagn 1991; 22:190-2.

26-Wasselhoeft H,Fawett JS,Johnson AL.Anomalous origin of the left coronary artery from the pulmonary trunk; its clinical spectrum , pathology , pathophysiology ,based on a review of 140 cases with seven further cases. Circulation 1968; 38:403-25.

27-Wilkins CE, Betancourt B, Mathur VS et al. Coronary artery anomalies. Texas Heart J 1988; 15:166-7